WHAT IS CLAIMED IS:

1. A high-frequency semiconductor device comprising:

a semiconductor substrate having a main surface;

a first wiring provided over said main surface of said semiconductor substrate; and

a conductor layer continuously covering a periphery of said first wiring with a first insulator interposed therebetween in a section crossing a direction of extension of said first wiring.

2. The high-frequency semiconductor device according to claim 1, further comprising a second wiring provided over said main surface of said semiconductor substrate with an insulating film interposed therebetween,

said conductor layer continuously covering upper and side surfaces of said second wiring with a second insulator interposed therebetween in a section crossing a direction of extension of said second wiring and being connected to said semiconductor substrate.

3. The high-frequency semiconductor device according to claim 1, wherein an upper surface of said conductor layer is flat.

4. The high-frequency semiconductor device according to claim 1, wherein said conductor layer transmits a source potential.

5. The high-frequency semiconductor device according to claim 2, wherein said conductor layer continuously covers a periphery of said second wiring in cooperation

with said semiconductor substrate with said second insulator and said insulating film interposed therebetween in said section crossing said direction of extension of said second wiring.

6. The high-frequency semiconductor device according to claim 1, wherein said first wiring is electrically connected to said semiconductor substrate through a conductor plug filled in a through hole selectively formed in said conductor layer with a side insulating film interposed therebetween in a part taken in said direction of extension of said first wiring.

7. The high-frequency semiconductor device according to claim 2, wherein a portion of said second insulator which covers said upper and side surfaces of said second wiring and is provided in contact with said conductor layer is formed of the same material.

8. The high-frequency semiconductor device according to claim 1, wherein a portion of said first insulator which covers upper and side surfaces of said first wiring and is provided in contact with said conductor layer is formed of the same material.

9. A method of manufacturing a high-frequency semiconductor device comprising the steps of:

(A) preparing a semiconductor substrate having a main surface;

(B) depositing a first conductor layer to cover said main surface of said semiconductor substrate;

(C) flattening an upper surface of said first conductor layer;

(D) forming a first insulating film on said upper surface of said first conductor layer thus flattened;

(E) depositing a first conductive film on said first insulating film;

(F) forming a second insulating film on said first conductive film;

(G) patterning said first conductive film and said second insulating film, thereby forming a first wiring and a first upper insulating film covering an upper surface thereof;

(H) depositing a third insulating film to cover said upper surface of said first conductor layer in such a thickness as to bury said first upper insulating film therein;

(I) removing said third insulating film to leave, as a first side wall, a portion covering side surfaces of said first wiring and said first upper insulating film;

(J) removing said first insulating film to leave portions covered with said first wiring and said first side wall, simultaneously with said step (I) or after said step (I);

(K) depositing a second conductor layer to cover said upper surface of said first conductor layer in such a thickness as to bury said first upper insulating film therein; and

(L) flattening an upper surface of said second conductor layer to maintain such a configuration that said first upper insulating film is buried.

10. A method of manufacturing a high-frequency semiconductor device comprising the steps of:

(A) preparing a semiconductor substrate having a main surface;

(B) depositing a first conductor layer to cover said main surface of said semiconductor substrate;

(C) flattening an upper surface of said first conductor layer;

(D) forming a first insulating film on said upper surface of said first conductor layer thus flattened;

(E) depositing a first sacrificial layer on said first insulating film;

(F) selectively forming, in said first sacrificial layer, a trench penetrating from an upper surface to a lower surface thereof;

(G) depositing a conductive material to fill in said trench;

(H) flattening said upper surface of said first sacrificial layer and an upper surface of said conductive material, thereby forming a first wiring of said conductive material;

(I) forming a second insulating film on said upper surface of said first sacrificial layer and an upper surface of said first wiring;

(J) removing said second insulating film to leave, as a first upper insulating film, a portion provided on said first wiring;

(K) removing said first sacrificial layer;

(L) depositing a third insulating film to cover said upper surface of said first conductor layer in such a thickness as to bury said first upper insulating film therein;

(M) removing said third insulating film to leave, as a first side wall, a portion covering side surfaces of said first wiring and said first upper insulating film;

(N) removing said first insulating film to leave portions covered with said first wiring and said first side wall, simultaneously with said step (M) or after said step (M);

(O) depositing a second conductor layer to cover said upper surface of said first conductor layer in such a thickness as to bury said first upper insulating film therein; and

(P) flattening an upper surface of said second conductor layer to maintain such a configuration that said first upper insulating film is buried.

11. The method of manufacturing a high-frequency semiconductor device according to claim 9, wherein said step (B) includes the steps of:

(B1) forming a fourth insulating film on said main surface;

(B2) forming a second conductive film on said fourth insulating film;

(B3) forming a fifth insulating film on said second conductive film;

(B4) patterning said second conductive film and said fifth insulating film, thereby forming a second wiring and a second upper insulating film covering an upper surface thereof;

(B5) depositing a sixth insulating film to cover said main surface of said semiconductor substrate in such a thickness as to bury said second upper insulating film therein;

(B6) removing said sixth insulating film to leave, as a second side wall, a portion covering side surfaces of said second wiring and said second upper insulating film;

(B7) removing said fourth insulating film to leave portions covered with said second wiring and said second side wall, simultaneously with said step (B6) or after said step (B6); and

(B8) depositing said first conductor layer to cover said main surface of said semiconductor substrate in such a thickness as to bury said second upper insulating film therein; and

said step (C) includes the step of:

(C1) flattening said upper surface of said first conductor layer to maintain such a configuration that said second upper insulating film is buried.

12. The method of manufacturing a high-frequency semiconductor device according to claim 10, wherein said step (B) includes the steps of:

(B1) forming a fourth insulating film on said main surface;

(B2) forming a second conductive film on said fourth insulating film;

(B3) forming a fifth insulating film on said second conductive film;

(B4) patterning said second conductive film and said fifth insulating film, thereby forming a second wiring and a second upper insulating film covering an upper surface thereof;

(B5) depositing a sixth insulating film to cover said main surface of said semiconductor substrate in such a thickness as to bury said second upper insulating film therein;

(B6) removing said sixth insulating film to leave, as a second side wall, a portion covering side surfaces of said second wiring and said second upper insulating film;

(B7) removing said fourth insulating film to leave portions covered with said second wiring and said second side wall, simultaneously with said step (B6) or after said step (B6); and

(B8) depositing said first conductor layer to cover said main surface of said semiconductor substrate in such a thickness as to bury said second upper insulating film therein; and

said step (C) includes the step of:

(C1) flattening said upper surface of said first conductor layer to maintain such a configuration that said second upper insulating film is buried.

13. The method of manufacturing a high-frequency semiconductor device

according to claim 9, further comprising the steps of:

(AA) selectively forming, in said first insulating film and said first conductor layer, a through hole penetrating from an upper surface of said first insulating film to a lower surface of said first conductor layer, after said step (D) and before said step (E);

(BB) forming a side insulating film covering a side wall surface of said through hole before said step (E); and

(CC) forming a conductive plug to fill in said through hole with said side insulating film interposed therebetween before said step (E),

said first conductive film being also deposited on said through hole to be connected to said conductive plug at said step (E), and

said first wiring being formed to be connected to said conductive plug by covering said through hole at said step (G).

14. The method of manufacturing a high-frequency semiconductor device according to claim 12, further comprising the steps of:

(AA) depositing a second sacrificial layer to cover said main surface of said semiconductor substrate in such a thickness as to bury said second upper insulating film therein, after said step (B7) and before said step (B8); and

(BB) patterning said second sacrificial layer to leave a part thereof as a columnar portion before said step (BB),

said first conductor layer being deposited to cover said main surface of said semiconductor substrate in such a thickness as to bury said second upper insulating film therein at said step (B8), and

an upper surface of said columnar portion and said upper surface of said first conductor layer being flattened to maintain such a configuration that said second upper

insulating film is buried at said step (C1), and said method further comprising the steps of:

(CC) removing said columnar portion, thereby forming a through hole in said first conductor layer after said step (C1) and before said step (D);

(DD) forming a side insulating film to cover a side wall surface of said through hole after said step (CC) and before said step (D); and

(EE) forming a conductive plug to fill in said through hole with said side insulating film interposed therebetween before said step (D),

said step (D) including the steps of:

(D1) forming said first insulating film on said upper surface of said first conductor layer which is flattened and over said through hole; and

(D2) selectively removing said first insulating film such that at least a part of an upper surface of said conductive plug is exposed,

said first sacrificial layer being deposited on an exposed surface of said conductive plug as well as on said first insulating film at said step (E),

said trench being formed such that said exposed surface of said conductive plug is exposed at said step (F), and

said conductive material being deposited to be connected to said exposed surface of said conductive plug at said step (G).

15. The method of manufacturing a high-frequency semiconductor device according to claim 14, wherein at least an upper surface portion of said fifth insulating film and said sixth insulating film are formed of the same material and said second sacrificial layer is formed of another material different therefrom.

16. The method of manufacturing a high-frequency semiconductor device according to claim 10, wherein at least an upper surface portion of said second insulating film and said third insulating film are formed of the same material.